POS 522 Weekly Science Report (16/04/18 to 22/04/18)

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Our coring success increased dramatically this week. Monday, April 16, we recovered cores from 1.5 to 4.5 m length at the eastern edge of our working area. Going westward across the northern half of the study region, Tuesday yielded four cores 1.7 to 3.1 m long. In the evening we had a meeting to discuss the science plan and decided to exchange some previous sites for alternative sites that seemed more promising for the project. At another E-W profile further north covered on Wednesday, April 18, we obtained three cores 5.8 to 6.7 m long. On Thursday, April 19, we moved to the eastern rim of the >3000 m deep Marsili basin where we expected to get deeper penetration but only got two 2.5 m cores; yet this was sufficient to show that the Holocene turbidity currents from Stromboli and the Stromboli channel reached this far north in the basin. On the morning of Friday, April 20, we were greeted by a school of jumping dolphins who apparently acted as good-luck charmes because we recovered three cores 5.5 to 7.5 m long when working along a W-E profile in-between the previous ones. The first core taken Saturday, April 21, was south of Lametini on the northeast shoulder of Stromboli channel; it contained only continent-derived turbidites and thus defines the eastern limit of dispersal of the Stromboli-derived turbidites. We then tested our luck by going back to the SW part of the plateau but two attempts of coring there failed. The same happened with the first attempt on Sunday, April 22, positioned at the SW slope from the plateau toward the Marsili basin. The second site was placed into the northeastern edge of Marsili basin in order to detect the distribution limit of the volcaniclastic turbidity currents; indeed, the 1.84 m long core only contained continent-derived, mica-rich turbidites.

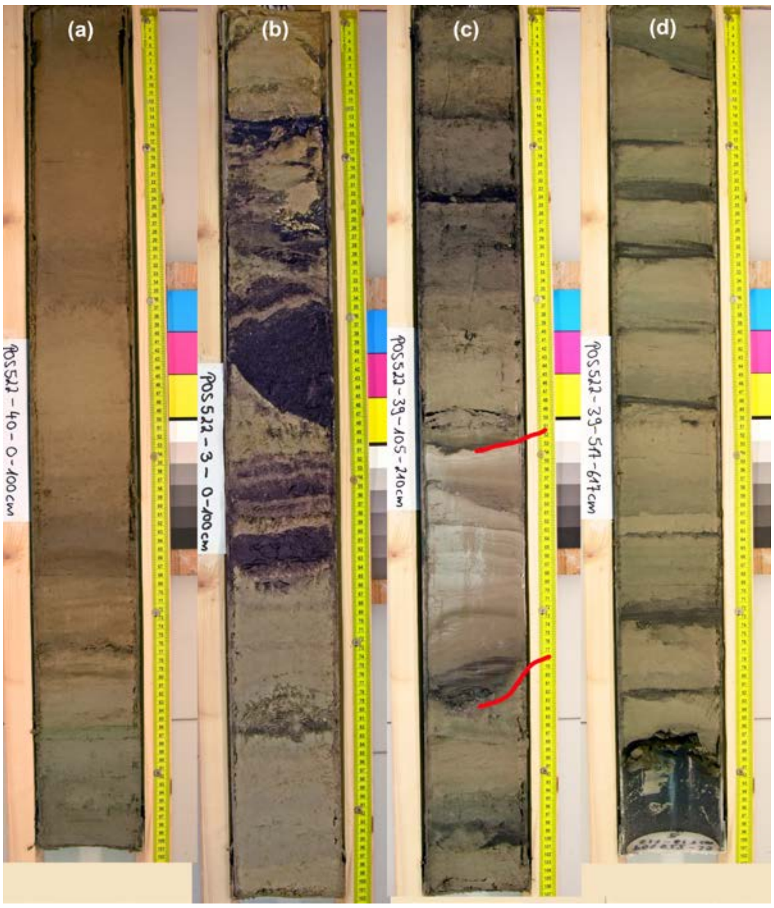

Fig. 1: (a) 90 cm brown „Holocene“ sediment with only thin traces of turbidite sands. From high ridge at NW rim of plateau. (b) Typical plateau section containing several black volcaniclastic turbidites with erosive basal contacts, and little brown silty mud sediment in-between. (c) Evolved ash turbidite (between red lines) consisting of several normally graded layers, with erosive basal contact. Tentatively correlated to Campanian Ignimbrite. (d) Lower “Pleistocene” section of greenish sediment intercalated with numerous black volcaniclastic and gray “continental” turbidites.

All cores show an overall similar stratigraphy but differ significantly in detail. They can be divided into a top part of brownish sediment, probably representing roughly the Holocene, and a lower part of greenish sediments, probably of late Pleistocene age. Both types of silty clay sediments are intercalated with mostly black, normally graded sandy turbidite layers as well a various thin primary ash fallout beds ranging from mafic to evolved compositions. The Holocene section includes two such prominent turbidites related to 5 ka and 10 ka flank collapses at Stromboli. Above the 5 ka layer we found thin layers in several cores that may be related to the historically documented 1343 and 1649 AD events at Stromboli. Many cores also contain an evolved ash layer probably from the Mt. Pilato eruption on Lipari (729 AD ?).
The turbidity currents were highly erosive even on the plateau 200 m above and up to 10 miles north of the Stromboli channel. The Holocene section varies greatly in thickness (15 to 100 cm) probably because of such erosion (Fig. 1b). The thickest Holocene sediment section occurs on top of the ridge that bounds the plateau at the NW, some 100 m above plateau level; sandy turbidites are almost completely missing in this section (Fig. 1a).
Below the Stromboli-related section we observed evolved ash layers and ash turbidites that are tentatively associated with the Campanian Ignimbrite (Fig. 1c) and possibly Albano volcano in the Roman province. The greenish lower sediment succession contains numerous black volcaniclastic turbidite layers (mostly <3 cm thick) more or less evenly distributed (approximately 30 per meter; Fig. 1d) but there are two intervals where up to 10 such layers are directly piled on top of each other.

All operations went without any problems and the weather stayed fine with a calm sea throughout the week. This allowed to improve the bathymetric mapping with much better quality multibeam data than in the first week. Continued CTD deployments documented variations in the sound velocity profiles. Thus mapping of the Alcione and Lametini seamounts was concluded while the “No-Name” seamounts west of Stromboli proved to lie too deep for the multibeam system. Figure 2 shows the about 1 km high circular Alcione seamount disrupted by a huge fault striking parallel to the continental slope and downthrowing the western half of Alcione.

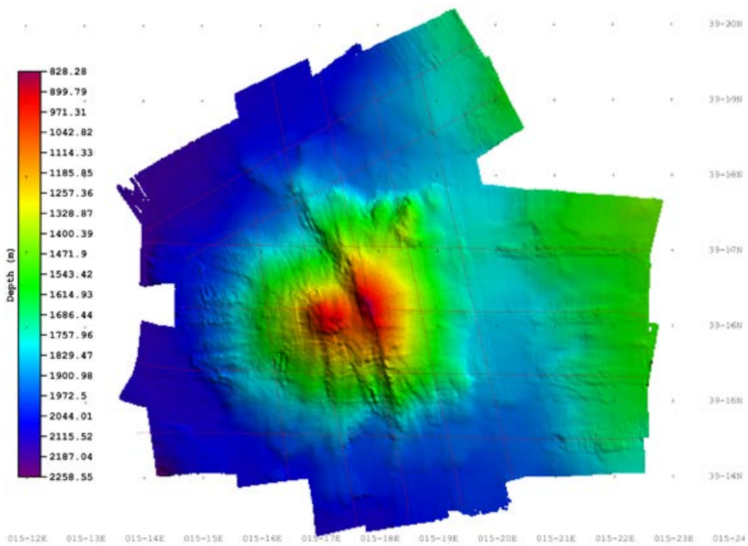

Fig. 2: Bathymetric map of Alcione seamount divided in halves by a NNW-SSE striking normal fault.

Sunday was the last sediment coring day and we remounted for dredge operations to follow on Monday.